AIR COMMAND AND STAFF COLLEGE

STUDENT REPORT

ESTABLISHING AIR RESEARCH AND DEVELOPMENT COMMAND: TWO CIVILIAN SCIENTISTS PLAYED KEY ROLES

MAJOR ARTHUR D. TUBBS 86-2570

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REPORT NUMBER 86-2570

TITLE ESTABLISHING AIR RESEARCH AND DEVELOPMENT COMMAND: TWO CIVILIAN SCIENTISTS PLAYED KEY ROLES

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Submitted to the faculty in partial fulfillment of requirements for graduation.

AIR COMMAND AND STAFF COLLEGE
AIR UNIVERSITY
MAXWELL AFB, AL 36112

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

ADA166671

REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	1b. RESTRICTIVE MARKINGS
2a. SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT **STATEMENT "A"** **Approved for public release;** **Distribution is unlimited.**
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE	
4. PERFORMING ORGANIZATION REPORT NUMBER(S) 86-2570	5. MONITORING ORGANIZATION REPORT NUMBER(S)
6a. NAME OF PERFORMING ORGANIZATION ACSC/EDCC — 6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION
6c. ADDRESS (City, State and ZIP Code) Maxwell AFB AL 36112-5542	7b. ADDRESS (City, State and ZIP Code)
8a. NAME OF FUNDING/SPONSORING ORGANIZATION — 8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c. ADDRESS (City, State and ZIP Code)	10. SOURCE OF FUNDING NOS. PROGRAM ELEMENT NO. — PROJECT NO. — TASK NO. — WORK UNIT NO.
11. TITLE (Include Security Classification) ESTABLISHING AIR RESEARCH AND	
12. PERSONAL AUTHOR(S) Tubbs, Arthur D., Major, USAF	
13a. TYPE OF REPORT — 13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Yr., Mo., Day) 1986 April — 15. PAGE COUNT 34
16. SUPPLEMENTARY NOTATION ITEM 11: DEVELOPMENT COMMAND: TWO CIVILIAN SCIENTISTS PLAYED KEY ROLES	
17 COSATI CODES: FIELD / GROUP / SUB. GR.	18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)

19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This paper presents a historical review of the establishment of Air Research and Development Command (ARDC) (the original name of Air Force Systems Command). Among many civilian scientists involved in establishing ARDC, two played key roles - Dr. Theodore von Karman and Dr. Louis Ridenour. The paper presents brief biographies of these two scientists.

20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT. ☒ DTIC USERS ☐	21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED
22a. NAME OF RESPONSIBLE INDIVIDUAL ACSC/EDCC Maxwell AFB AL 36112-5542	22b. TELEPHONE NUMBER (Include Area Code) (205) 293-2483 — 22c. OFFICE SYMBOL

DD FORM 1473, 83 APR — EDITION OF 1 JAN 73 IS OBSOLETE.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

PREFACE

This paper presents a historical review of the establishment of Air Research and Development Command (ARDC) (the original name of Air Force Systems Command). Several civilian scientists were instrumental in establishing ARDC. The paper focuses on two of those civilian scientists who played key roles - Dr. Theodore von Karman and Dr. Louis Ridenour - with brief biographies of each scientist presented.

The author wishes to acknowledge the help provided by his advisor, Major Roger Wickert, Air Command and Staff College Faculty Instructor; and sponsor, Mr. R. Cargill Hall, Chief, Research Division, USAF Historical Research Center. In addition, the author is deeply indebted to his wife, Patti, and son, Derek, for their typing assistance and overall support.

ABOUT THE AUTHOR

Major Arthur D. Tubbs enlisted in the Air Force in May 1971. While attending technical school after basic training, he applied for and was accepted into the Airman's Educational and Commissioning Program (AECP). In AECP he completed a Bachelor of Science Degree in Mechanical Engineering at the University of Texas in May 1973 and was commissioned through OTS in September 1973. His first assignment after OTS was to Air Force Logistics Command at Sacramento Air Logistics Center, McClellan AFB, California, where he worked as a project engineer. After over four years in Sacramento, he was reassigned in the summer of 1978 to Air Force Systems Command at the Armament Division, Eglin AFB, Florida. At Armament Division, he worked in the Munitions Systems Program Office as a configuration manager and project manager on various munitions programs. In April 1981 he was reassigned to HQ Air Force Systems Command (AFSC), Andrews AFB, Maryland. While at HQ AFSC, he worked in personnel during his first two years as an assignments officer in the DCS/Manpower and Personnel. He spent his third year as a planning officer in DCS/Plans. He returned to personnel for his last year at HQ AFSC as a branch chief in officer assignments. In 1980 Major Tubbs received his Master of Business Administration Degree from the University of West Florida. He graduated from Squadron Officer School in residence in 1977, and completed Air Command and Staff College by seminar in 1982. His decorations include the Air Force Meritorious Service Medal with one oak leaf cluster, and the Air Force Commendation Medal. He is married to the former Patricia Ann Curran of Bangor, Maine, and they have two children: Amy and Derek.

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EXECUTIVE SUMMARY

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REPORT NUMBER 86-2570

AUTHOR(S) MAJOR ARTHUR D. TUBBS, USAF

TITLE ESTABLISHING AIR RESEARCH AND DEVELOPMENT COMMAND: TWO CIVILIAN SCIENTISTS PLAYED KEY ROLES

I. Purpose: To examine the historical events that led to the establishment of Air Research and Development Command (ARDC) and identify the key civilian scientists who played key roles. Air Research and Development Command is the original name of Air Force Systems Command (AFSC).

II. Problem: While the establishment of ARDC has been documented in the unit histories of ARDC/AFSC, the role played by civilian scientists in ARDC's establishment has not been a focus of previous documentation.

III. Data: Air Research and Development Command was established in 1950 as a result of efforts begun in 1944 by General "Hap" Arnold. General Arnold appointed the noted civilian scientist and personal friend, Dr. Theodore von Karman, to form the Scientific Advisory Group made up of primarily civilian scientists. The group's post World War II advisory reports became the benchmark for future Air Force research and development efforts. This group was permanently organized into the Scientific Advisory Board (SAB) in 1946. In 1949 General Hoyt Vandenberg, Air Force Chief of Staff, tasked the SAB to study the Air Force research and development efforts and

CONTINUED

recommend improvements to the Air Force research and development organization. Dr. von Karman appointed Dr. Louis N. Ridenour to chair the special committee to respond to General Vandenberg's request. This committee submitted the results of their study, known as the Ridenour Report, to General Vandenberg in September 1949. The report recommended the establishment of a separate Research and Development Command and a new Air Staff Deputy Chief of Staff for Research and Development. General Vandenberg approved the report's recommendations and established Research and Development Command in early 1950. Dr. Ridenour was appointed the first chief scientist of the Air Force and helped implement the recommendation of his committee's report.

IV. Conclusion: The establishment of Research and Development Command was due in large part to the key roles played by civilian scientists like Dr. Theodore von Karman and Dr. Louis N. Ridenour.

Introduction

The Air Force learned many lessons from World War II. One important lesson was while the US and her allies won the war by quantity and quality of existing weapons, the opposition could have seriously threatened us with new weapons that we could not match if the war had lasted much longer (4:104). We were far behind in such new weapons technologies as jet propulsion and guided missiles (4:104). We also had serious deficiencies in our development and testing programs due to a lack of equipment and personnel (4:104). Our developments in some areas were hampered by gaps in basic knowledge in various phases of chemistry, geophysics, physics, mathematics, and metallurgy (4:104). There were those in the Air Force and civilian scientific community who believed World War II demonstrated the need for broader, deeper, more integrated, and continuing application of US scientific resources to the problems of the Air Force (4:104). This paper traces the origin of the research and development organization established to meet this need and focuses on two civilian scientists who played key roles.

Chapter One

ESTABLISHING ARDC

AFTER WORLD WAR II

General Arnold's Vision

One such Air Force leader concerned about the future of the Air Force after World War II was the Commanding General of the US Army Air Forces, General Henry H. "Hap" Arnold. He was probably the greatest proponent of air power and spoke out strongly for strategies, technologies, and equipment that would give the US the airpower necessary for national security in a post-war world (13:2). He wrote, "A modern, autonomous, and thoroughly trained Air Force in being at all times will not alone be sufficient, but without it there can be no national security" (13:2). He believed aviation science would stagnate without new technology and by failure to keep ideas and plans oriented toward the future (13:2). He also believed the Air Force had to expand its research facilities and make them available to civilian industry and scientists to work aviation problems (13:2). Additionally he believed technical military personnel had to be recruited and trained to operate sophisticated weapon systems and sustain scientific growth (13:2).

Arnold's Scientific Advisory Group

General Arnold began to put his ideas to work even before the end of World War II. In September 1944 he invited Dr. Theodore von Karman, a noted civilian scientist, to put together a research plan for the development of the future Air Force (13:4). In response to Arnold's request Dr. von Karman organized the Scientific Advisory Group (SAG) by gathering about him a group of 27 American scientists from every field of research having a bearing on air power (15:xv, xvii). Under Dr. von Karman's direction these men analyzed important developments in the basic sciences, both here and abroad, and attempted to evaluate the effects of their application to air power (15:xv).

Two Key Reports

In August 1945 Dr. von Karman and the SAG submitted the first of two reports to General Arnold that would lay the foundation for the reorganization of Air Force research and development activities (13:4). In Where We Stand Dr. von Karman and the SAG identified many new aspects of aircraft, command and control, and rocket technology. The report was based primarily on findings of the SAG in a survey of German research and development facilities in May 1945 shortly after VE Day (13:4). The report strongly emphasized the need for the Air Force to incorporate German concepts of war material in its plans for the future (13:4).

The von Karman-led group's second report, Toward New Horizons, consisted of 33 volumes and was submitted to General Arnold in December 1945 (13:6). It was an even more comprehensive survey of research and development potential and its application to the future needs of the Air Force (13:6). In the first volume, Science: The Key to Air Supremacy, Dr. von Karman identified and emphasized the role of science in future aerial warfare (13:6). The SAG also recommended in this volume separating the funds and management of research and development contracts from procurement contracts (15:92). Dr von Karman felt this report would have a lasting effect on the Air Force. He stated in his autobiography, The Wind and Beyond,

> I believe that Toward New Horizons, together with a companion volume, Science: The Key to Air Supremacy, was the first exhaustive report of its kind in the history of the American military forces. It definitively made the point that the Air Force was the major defense arm of the nation and that defense was clearly dependent on a continuous input of technological and scientific progress. It included technical forecasting for five or ten years ahead as a military requirement, and it created an atmosphere for basic scientific research in the Air Force. I made the point too - which I think is still vital - that the concept of civilian control. . . would only injure progress in Air Force research. Such research should be dispersed among all the people and their institutions. I believe this point of view guided the military thinking throughout the 1950s, and played a great part in bringing about the scientific Air Force of today (3:294).

Dr. von Karman went on in his autobiography and reported General Arnold's reaction to their report,

> General Arnold, who was recovering from his heart attack, was enormously pleased with our job. He said to me (and later wrote it in a letter) that the report

would be used "for some time to come as a guide to the Commanding General of the AAF in discharging his responsibilities for research and development" (3:291).

DCS/R&D and RAND

In 1945 based on the recommendations from Dr. von Karman and the SAG, General Arnold established a Deputy Chief of Staff for Research and Development (DCS/R&D) and assigned Major General Curtis E. LeMay to the position (13:7). In the DCS/R&D General LeMay tried to bring together people from operations and research and development for the first time. He believed a better understanding of the operational requirements would help R&D people better plan their programs and that a knowledge of possible new weapons would help operations people plan better strategy (14:5). The idea was resisted and unsupported, and the structure was too unwieldy to be workable (14:5). It was impossible for this single office to manage the scattered research and development efforts being carried on in various areas of the Air Force and the whole research and development program bogged down (14:5).

However, General Arnold, shortly before his retirement, and General LeMay succeeded in 1946 in establishing the nonprofit Research and Development (RAND) Corporation (14:5). RAND grew out of a long range contract project, initially made with Douglas Aircraft Corporation, that called for a staff of civilian scientists and engineers to study the full scope of

intercontinental warfare and the best means of conducting such a conflict (13:7).

The Air Policy Commission

As the rapid demobilization of the U.S. Armed Forces proceeded after World War II, growing awareness of the potential Soviet threat forced US military and civilian leaders to look hard at the post-war defense capability of the Army Air Forces (13:7). The atomic bomb was our strength, but planners felt the Soviets would soon produce their own atomic weapons (14:5). Air Force leaders believed air power was an absolute requirement to maintain our national defense, and a vital national aviation industry capable of mobilization would be major factor in maintaining air power (13:8). President Harry Truman and Congress were also concerned about the strength of our air power (14:6).

Due to his concern, on 18 July 1947 President Truman established the ad hoc Air Policy Commission "to make an objective inquiry into national aviation policies and problems, and to assist me in formulating an integrated national aviation policy" (14:6). Chaired by Thomas K. Finletter, later the second Secretary of the Air Force (1950-1953), the commission presented its report, "Survival in the Air Age," on 1 January 1948 (14:6). The commission clearly concluded that air power must be the foundation of military security (13:9). It further

supported the concepts advanced earlier by Dr. von Karman and General Arnold (13:9).

A SEPARATE UNITED STATES AIR FORCE

An Unheeded Recommendation on R&D

Shortly after the appointment of the Air Policy Commission in July 1947, the United States Air Force was established as a separate military service on 18 September 1947 (13:9). In the following month, October 1947, the office of the Air Force Assistant for Atomic Energy put out a staff study, "Development of the Air Force for Atomic Warfare." The staff study recommended the establishment of a new Deputy Chief of Staff for Development on the Air Staff and a separate Air Force command for development. The new command would be responsible for keeping "abreast, indeed, ahead of any potential enemy in the development of new and better weapons for aerial warfare" (13:9; 14:6). This recommendation had both support and resistance among Air Force officers, but organizational inertia prevented its early adoption. For the time being R&D continued to take a back seat to production (13:9).

Scientific Advisory Board and The Ridenour Report

In April 1949 after already disapproving two proposed reorganizations to emphasize research and development, General Hoyt S. Vandenberg, Air Force Chief of Staff since April 1948, requested the Scientific Advisory Board (SAB) review the state of research and development in the Air Force (14:6). General

Arnold had established the SAB as the Scientific Advisory Group in 1944 and Dr. Theodore von Karman was still its chairman in 1949. Dr. von Karman appointed a special committee chaired by Dr. Louis N. Ridenour to conduct the review requested by General Vandenberg (13:10). The committee studied all Air Force research and development functions, especially their organizational structure and operating policies (13:10). The Ridenour Committee submitted its report, "Research and Development in the United States Air Force," on 21 September 1949 (13:10). In their report the committee recommended establishment of a new command, the Research and Development Command, responsible for research and development separate and independent of the Air Material Command (AMC) (13:10). They also recommended the Air Staff have a Deputy Chief of Staff for Research and Development (13:10). The committee believed the recommended organizational structure would "make it easier to introduce the necessary improvements in personnel, programs, and budget policy" (13:10).

A Military Committee Agrees

After receiving the Ridenour Report compiled by a group of civilian scientists, General Vandenberg deemed it prudent to have a comparable military group conduct a like study (14:6-7). He therefore requested that Air Univeristy appoint a special committee to study the same area (14:7). On 19 November 1949 the Air University committee, chaired by General Orville A.

Anderson, submitted their findings to General Vandenberg as a staff study known as the "Anderson Report" (14:7). The report's recommendations were almost in total agreement with those of the Ridenour Report in that it also proposed the establishment of a separate Research and Development Command and a Deputy Chief of Staff for Research and Development (14:7).

Birth of Research and Development Command

HQ USAF staffed the recommendations of the Ridenour and Anderson Reports in late 1949 and early 1950. At a 3 January 1950 staff meeting, General Muir S. Fairchild, Vice Chief of Staff of the Air Force, approved the recommendations to establish a Deputy Chief of Staff for Development at HQ USAF and the Research and Development Command (RDC) in accordance with the recommendations of the Ridenour and Anderson Reports (13:12). Research and Development Command was officially established on 23 January 1950 at Washington D.C., with an initial assignment of 20 officers, 5 airmen, and 20 civilians; and Major General David M. Schlatter was appointed as its first commander (14:7). The command's official name was changed to Air Research and Development Command (ARDC) on 16 September 1950 (13:16).

Break from Air Materiel Command

The original transition plan called for ARDC to gradually assume responsibility for Air Materiel Command's research and development activities, but the gradual transfer process proved

to be much more difficult than planned (13:16). ARDC leadership favored a "one-time, one-date," assumption of all research and development activities while AMC preferred the gradual transfer as originally planned (13:16). Also ARDC and AMC could not agree on where development ended and production began (13:16). General Vandenberg settled the disputes by issuing a 28 March 1951 directive to the ARDC and AMC commanders calling for the "immediate activation of Air Research and Development Command as an independent Air Force Command, effective 2 April 1951" (13:16).

The Key Civilian Scientists

The events after World War II leading to the establishment of ARDC involved many civilian scientists. But in the author's opinion the two civilian scientists who made the most significant contributions were Dr. Theodore von Karman and Dr. Louis N. Ridenour. At General Arnold's request Dr. von Karman established and chaired the Scientific Advisory Group that was responsible for the two key reports - Where We Stand and Toward New Horizons. Those two reports caused the Air Force to begin focusing on research and development and planning for the future. Dr. Louis N. Ridenour was a member of Dr. von Karman's Scientific Advisory Board (SAB), and chaired the SAB ad hoc committee that formally recommended the establishment of a separate research and development organization. The Ridenour Report became the basis for establishing ARDC. In chapters two

and three the author will present a brief biography of Dr. von Karman and Dr. Ridenour, respectively.

Chapter Two

DR. THEODORE VON KARMAN

INTRODUCTION

Dr. Theodore von Karman has been called "The Einstein of Aviation," "The Father of the Supersonic Flight," and "The Patron Saint of the US Air Force" (8:68). Each title is appropriate and deserved because much of Dr. von Karman's work forms the basis for modern aerodynamics (8:68). In this chapter the author will present a brief biography of Dr. von Karman including his association with the US Air Force.

EUROPEAN YEARS

Early Life in Hungary

Theodore von Karman was born on 11 May 1881, in Budapest, Hungary, to Professor Maurice and Helene von Karman (1:622). He was the third son in a family of four sons and a daughter (7:253). He was a child prodigy who could multiply five-digit numbers in his head by the age of six, and also learned to speak six languages (8:68; 10:88). His father, a professor of philosophy and education at the University of Budapest, encouraged young Theodore's early interest in science and

engineering (7:253; 1:622). Theodore von Karman would also adopt his father's strong internationalist outlook (7:253).

Von Karman began his collegiate studies in 1898 at the Royal Joseph University in Budapest and graduated with honors in 1902 with a degree in mechanical engineering (7:254). After graduating he completed a year of military service and returned to his alma mater as an assistant professor until 1904 (1:622). At that time he left academia briefly to work as an engineer with the Ganz Company, machinery manufacturers, until 1906 (6:12).

Move to Germany

In 1906 von Karman enrolled under a two-year fellowship at the highly regarded University of Gottingen in Berlin, Germany, where he studied under Ludwig Prandtl, the "father of modern aerodynamics" (7:254). While working toward his PhD at Gottingen, von Karman visited Paris, France, in the summer of 1907. There he witnessed the historic first powered flight of an airplane in France by Henri Farman. This event "sparked an abiding fascination in the theory of aerodynamics" (6:12; 7:254). Von Karman received his PhD in 1908 and continued at Gottingen as an associate professor until 1912. During this period, specifically in 1911 and 1912, Dr. von Karman developed and published three papers that formed his classic theory known as the Karman Vortex Trail. This theory involves the unsymmetrical vortex arrangement in the wake of a cylinder (6:12; 7:254).

From Berlin to Aachen

In 1912 Dr. von Karman accepted an offer to move to the University of Aachen, Germany, to become the director of its newly established Aeronautics Institute and professor of aeronautics and astronautics (1:623). He remained in this position at Aachen until 1919, but his career there was interrupted by World War I (6:12). From 1914 to 1918 von Karman served the Austro-Hungarian Aviation Corps as its Director of Research (6:12). During this period he designed a helicopter with two counter-rotating main rotor blades and learned the art of "getting along" with military generals and admirals (6:12-13).

UNITED STATES YEARS

From Aachen, Germany, to Pasadena, California

Dr. von Karman first visited America in 1926 when invited by the Guggenheim Foundation and Dr. Robert Millikan, a Nobel-Prize winning physicist at the California Institute of Technology (Caltech) (6:13). Three years later, having alternated between his duties at Aachen and a research associate position at Caltech, von Karman decided to settle permanently in California (6:13). In 1930 he became Director of the Guggenhiem Aeronautical Laboratory of the California Institute of Technology (GALCIT) at Pasadena, California, and of the Guggenheim Airship Institute at Akron, Ohio (6:13). In 1936 Dr. von Karman became an American citizen (1:623).

Friendship with "Hap" Arnold Begins

It was about this time in the early 1930's that Dr. von Karman and the future commander of the Army Air Forces, Henry H. "Hap" Arnold, met and began a close association and friendship that would last until Arnold's death in 1950 (2:3). Arnold was a major at the time in command of March Field, California (2:3). He often visited Dr. von Karman to observe the wind tunnel and von Karman's experiments and talk with von Karman (2:3). Even after Arnold moved to Washington, D.C., in 1936 to become the Assistant Chief of the Air Corps, he visited Caltech and von Karman because of his continuing personal interest in von Karman's jet propulsion and rocket motor experiments (2:3). In 1938 as Europe was becoming enveloped in World War II, General Arnold, now commander of the Army Air Forces (AAF), appointed Dr. von Karman a consultant to the AAF and special advisor at Wright Field, Dayton, Ohio (1:623). Arnold became so confident in von Karman's judgement and worked so easily with him that if he needed quick answers he often bypassed normal staff channels and went straight to von Karman with his questions (2:3).

During this period von Karman performed studies on the Bell X-1, later the first manned aircraft to break the sound barrier (1:623). In 1939 he began the GALCIT Rocket Research Project without outside funding to enable his graduate students to do rocket research (6:13-14). This led to an AAF funded project to develop jet assisted takeoff (JATO) rockets for use on heavy

bombers (1:623). The facilities established as a result of this project became the Jet Propulsion Laboratory in 1944 (6:14; 7:255). In 1942 after successfully developing the JATO rockets, von Karman and a few friends founded Aerojet Engineering Corporation at Azusa, California, to manufacture the JATO rockets (1:623).

Forming the Scientific Advisory Group

In 1944 Dr. von Karman's association with General Arnold and the AAF became even closer when General Arnold asked him to organize and chair an AAF Scientific Advisory Group to chart the postwar future of airpower (10:89). As discussed in chapter one, it was this group of scientists, personally selected by von Karman, that produced the reports Where We Stand and Toward New Horizons with its summary volume, Science, Key to Air Supremacy. These reports became the "lodestone and the touchstone of Air Force research and development" (2:11). Based largely on the recommendations of von Karman and the Scientific Advisory Group in these and other reports, the Air Force initiated a "vigorous program of aeronautical research and development" (7:255). Von Karman remained the chairman of the Scientific Advisory Group (in 1946 it was reorganized as the Scientific Advisory Board) until 1954 (6:15).

Dr. von Karman as Internationalist

Dr. von Karman was also very active around the world searching for ways to promote and unite international scientific

cooperation and endeavors (7:256). For example, in 1951 he was an organizer and Honorary President of the International Union of Theoretical and Applied Mechanics (7:256). Also in 1951 von Karman chaired a meeting of the directors of aeronautical research from the NATO nations that led in 1952 to the formation of the NATO Advisory Group for Aeronautical Research and Development (AGARD). He chaired AGARD, headquartered in Paris, France, until his death in 1963 (6:15; 7:255). Additionally in 1958 von Karman was instrumental in organizing the International Congresses of the Aeronautical Sciences (ICAS) and served as its Honorary President until his death (6:17).

Awards, Death, Final Words of Praise

During his long and productive career, Dr. von Karman received over 60 awards and honorary degrees from all over the world that recognized his contributions to science theory, the teaching of engineering, national defense, and international cooperation (6:17; 7:257). His last award, the first National Medal of Science, was presented by President John F. Kennedy in Washington, D.C., in February, 1963 (7:257). Shortly after that von Karman traveled on a sentimental visit to Aachen, Germany, to rest and prepare for upcoming international meetings (7:257). But before he could attend the meetings, he died of a heart attack on 7 May 1963, five days before his 82nd birthday (8:68; 7:257).

The following are some thoughts of a few of Dr. von Karman's colleagues that sum up the contributions of this great scientist: Joseph V. Charyk, former Air Force Assistant Secretary for R&D, said,

> Some men have genius. Some have vision. Some can counsel, and some can lead. Only rarely in history does there appear a man possessing all these attributes. When one does appear, the field of man's endeavors grows dramatically. Its impact on the period is profound. As his field of effort has grown, and as its results have been felt throughout the world of his time, so may we see the real worth of Theodore von Karman (6:12).

Dr. T.F. Walcowicz, one of the few military members of the original Scientific Advisory Group and a former student of von Karman, stated,

> On May 6, 1963, there passed into history the intellectual giant of the past century in the applied sciences relating to aeronautics and astronautics. A man with humor and humility, who had a complete awareness of what he did not know, and who had the greatest respect for those in fields other than his, particularly great airmen (12:69).

Finally, another charter member of the SAG and former head of NASA, Dr. Hugh L. Dryden wrote about von Karman,

> Such in broad outline are the contributions of this most remarkable scientist, educator, engineer, international personality, and leader. The printed word cannot set forth his human qualities, his friendliness, his sense of humor, his interest in each person as an individual, and his broad interest in art, philosophy, science, and in fact, all human affairs (6:17).

Chapter Three

DR. LOUIS N. RIDENOUR, JR.

INTRODUCTION

While Dr. Louis N. Ridenour, Jr., may not be a familiar name to the general public like Dr. Theodore von Karman, he was still considered in the scientific community as "one of the prime architects of the space age" (5:90). In this chapter the author presents a brief biography of Dr. Ridenour that includes his association with the US Air Force.

EARLY YEARS

Birth Through Formal Education

Louis N. Ridenour was born on 1 November 1911 in Montclair, New Jersey (9:20). He was awarded a B.S. degree in Physics from the University of Chicago (9:20). In 1935 Ridenour was awarded his PhD in Physics from the California Institute of Technology (9:20).

From Student to Professor

Later in 1935 Ridenour returned to his home state of New Jersey as a physics instructor at Princeton University and remained there until the fall of 1938 (9:20). He then moved to the University of Pennsylvania to work under Dr. Harnwell, the

head of the physics department (9:20). While there, Ridenour initiated the construction of an electrostatic accelerator to perform precise nuclear physics measurements, but World War II broke out before it was completed (9:20).

World War II Radar and Bombsight

In 1941 he became the assistant director of the Massachusetts Institute of Technology (MIT) Radiation Lab and helped "transform primitive radar into a reliable defensive and offensive military tool" (5:90). While in this position during World War II, Ridenour also developed a relatively simple bombsight for use with bomber aircraft that the Air Force proved very successful (11:248). Also during this period Ridenour was the editor of the Radiation Laboratory Technical Series, a series of 28 volumes that described the state-of-the art of radar as of the end of the war (11:248; 9:20).

Back to Academia

In 1946 Dr. Ridenour returned to the University of Pennsylvania for one year and then, in 1947 he became dean of the Graduate College of the University of Illinois (9:20). During the next three years as dean, he was instrumental in establishing the Control Systems Laboratory, the Digital Computer Laboratory, and the Radio Carbon Laboratory, as well as a microbiology group and solid state group (9:20).

SERVING THE AIR FORCE

Scientific Advisory Board and Ridenour Committee

In 1948 while still at the University of Illinois, Dr. Ridenour accepted an invitation to become a member of the US Air Force Scientific Advisory Board (SAB) (2:141). In April 1949 the Air Force Chief of Staff requested the SAB conduct a comprehensive review of Air Force research and development (2:31). Dr. von Karman, SAB chairman, selected Dr. Ridenour as chairman of what was officially designated the "SAB Special Committee on Research and Development Facilities, Budget and Personnel," but known informally as the Ridenour Committee (2:32). The committee met about twenty times over the next six weeks studying the state of Air Force research and development (2:33). They submitted their report to General Vandenberg on 21 September 1949. The report recommended the establishment of a Research and Development Command separate from Air Materiel Command and the establishment of a Deputy Chief of Staff for Research and Development on the Air Staff (2:34).

First Chief Scientist of the Air Force

In the summer of 1950 Dr. Ridenour was appointed the first Chief Scientist of the Air Force and as such worked to implement the recommendations of the Ridenour Report (9:21). Due to his and efforts of others, both military and civilian, the Air Force established the Research and Development Command on 23 January 1950 and also established the Deputy Chief of Staff

for Research and Development on the Air Staff (13:12). Dr. Ridenour was also instrumental in the establishment of the Lincoln Laboratory of the Massachusetts Institute of Technology which developed the SAGE air defense system and DEW Line (9:21).

POST AIR FORCE WORK

Move to California and Sudden Death

Around 1952 when his younger daughter became seriously ill, Dr. Ridenour moved to California and became vice president of International Telemeter Corporation in Los Angeles (9:21). In 1955 he moved employment to Lockheed Aircraft Corporation and began recruiting research personnel for its Missile Systems Division (9:21). He was promoted by Lockheed several times until he was named Vice President and General Manager of the Electronics and Avionics Division of Lockheed Aircraft Corporation (9:21). Two months after his promotion, on 21 May 1959, he died of a cerebral hemorrhage in Washington, D.C. (9:21; 5:90). Two fellow scientists, Frederick Seitz and A.H. Taub, wrote this about Dr. Ridenour after his death,

> When Louis N. Ridenour died on 21 May 1959 the scientific community lost a remarkable physicist and scientific administrator who had an uncanny ability to sense the areas in which a scientific or a technological "harvest" is likely. He devoted himself to helping achieve and exploit such breakthroughs. This he did as a working physicist in his early years. In his later years he accomplished his goal as dean of the Graduate College at the University of Illinois, as chief scientist of the Air Force, as an executive with International Telemeter Corporation, and finally, with Lockheed Aircraft Corporation (9:20).

Conclusion

The establishment of ARDC occurred in 1950 because of the efforts of many individuals, both military and civilian. In 1944 General Henry H. "Hap" Arnold had the vision to plan for the Air Force of the future. He called on his longtime friend from the civilian scientific community, Dr. Theodore von Karman, to develop that plan. Dr. von Karman and his group of fellow scientists known as the Scientfic Advisory Group provided General Arnold the plan for the future when they submitted in 1945 their two key reports, Where We Stand and Toward New Horizons (which included the summary volume Science: The Key to Air Supremacy). These two reports formed the basis for sweeping changes in the way the Air Force managed its research and development programs.

In 1949 General Vandenberg relied on Dr. von Karman and his Scientific Advisory Board to advise him how to better manage Air Force research and development. Dr. von Karman chose the very able Dr. Louis Ridenour to head the committee that produced the Ridenour Report. This report became the blueprint for modern Air Force research and development by recommending a separate Research and Development Command and Air Staff Deputy Chief of Staff for Research and Development. In 1950 as Chief Scientist

of the Air Force, Dr. Ridenour helped implement the Ridenour Report recommendations.

Due in large part to the efforts of civilian scientists like Theodore von Karman and Louis Ridenour, the Air Force established the Research and Development Command. That organization, now known as Air Force Systems Command, went on to develop the Air Force's weapon systems of today and is currently developing their weapon systems of the future.

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